Environmental aspects of intensive agricultural practices: the case of the raised bed system

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Abstract: *Poldered-fields have developed in the last century along the many canals that cross the lower part of the Chao Phraya delta near Bangkok. Each field, surrounded by a dike to protect the field from floods, is made of long beds around 2 meters in width separated by ditches. The level of water inside the plot is controlled by a pump, and the water of the ditches is used to water the crops. Very intensive systems using large amounts of fertilizers and pesticides have developed in these fields. Grape is the most intensive crop by the amount of pesticide applied.*

The objective of the study was to investigate the fate of fertilizers and pesticides applied to the fields. Therefore, the amount of nutrients and pesticides discharged from the fields into the canal were studied. Soils and water samples were collected and analyzed for physico-chemical properties, including pesticide contamination. The accumulation of elements in the soil profile was investigated in three different fields by taking soil samples to 50 cm depth.

The average mineral fertilization applied to grape was estimated to be 670 kg N, 300 kg P and 560 kg K year-1 ha soil-1, not to mention some organic manure. Insecticides and fungicides are usually applied in combination every 4 days. The most used pesticides are methomyl, chlorphenapyr, methamidophos, amitraz and copper oxychloride.

A regional survey showed that 28% of the water samples were contaminated, out of 148 samples taken along the canals. Further studies proved that monochrotophos and dimethoate, two widespread insecticides, were present at a concentration between 0.6 to 13.4 µg L-1. At these concentrations the pesticides are not a hazard to aquatic life and human health.

The discharge of nutrients in the canals was minimal both in suspension and in solution. Thus fertilizer overuse did not lead to pollution of the canals. Most applied elements accumulated in the soil profile, resulting in high values for P, K, Cu and Zn that can be detrimental to crop growth. Discontinuing P and K application for one year did not decrease grape yield. It should be possible to decrease fertilizer application without any decrease in yield, an important change for both farmer's profit and the environment.

Full paper not provided

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